AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in this application:

LISTING OF CLAIMS:

1.   (Currently Amended)   Method for determining a load vector acting on a rolling element bearing (1), in which the method comprises: measuring displacement and/or strain using N sensors (8) for determining displacement and/or strain in a ring shaped elements (5, 6, 7) of the rolling element bearing (1); determining a deformation of the element (5, 6, 7) by calculating amplitude and phase of N/2 Fourier terms representing at least one radial mode shape of the ring shaped element (5, 6, 7); feeding the N/2 Fourier terms to a bearing neural network (12), the bearing neural network (12) being trained to provide the load vector on the rolling element bearing (1) from the N/2 Fourier terms.

2.   (Currently Amended)   Method according to claim 1, in which the rolling element bearing (1) comprises two rows of coaxial bearings (1, 1'), the ring shaped element of the rolling element bearing being the bearing outer ring (5) of one of the two rows of coaxial bearings (1, 1').

3.   (Currently Amended)   Method according to claim 1 or 2, in which the N sensors (8) comprise strain sensors, and the at least one radial mode shape comprises a mode shape of order zero and one or more mode shapes of order two or higher.

4.   (Currently Amended)   Method according to claim 1 or 2, in which the N sensors (8) comprise displacement sensors and the least one radial mode shape comprises one or more mode shapes of order zero and higher.

5.   (Currently Amended)   Method according to ~~one of the claims 1 through 4~~ <u>claim 1</u>, further comprising determining N/2 Chebyshev polynomial coefficients from the N sensor signals, representing at least one axial mode shape of the ring shaped element ~~(5, 6, 7)~~.

6.   (Currently Amended)   Method according to ~~one of claims 1 through 5~~ <u>claim 1</u>, in which the bearing neural network ~~(12)~~ is trained using a plurality of data sets, each data set comprising a predefined load vector on a specific type of rolling element bearing ~~(1)~~ and associated measurement data from the N sensors ~~(8)~~.

7.   (Currently Amended)   Sensor arrangement for determining a load vector acting on a rolling element bearing ~~(1)~~ in operation, the sensor arrangement comprising a plurality of N sensors ~~(8)~~ which measure displacement and/or strain for determining displacement and/or strain in one of the elements ~~(5, 6, 7)~~ of the rolling element bearing ~~(1)~~; a mode shape coefficients calculator ~~(11)~~, connected to the plurality of N sensors ~~(8)~~, for determining a deformation of the element ~~(5, 6, 7)~~ by calculating amplitude and phase of N/2 Fourier terms representing at least one radial mode shape of the ring shaped element ~~(5, 6, 7)~~; a bearing neural network ~~(12)~~, connected to the mode shape coefficients calculator ~~(11)~~, the bearing neural network ~~(12)~~ being trained to provide the load vector on the rolling element bearing ~~(1)~~ from the N/2 Fourier terms.

8.   (Currently Amended)   Sensor arrangement according to claim 7, in which the rolling element bearing ~~(1)~~ comprises two rows of coaxial bearings ~~(1, 1')~~, the ring shaped element of the rolling element bearing being the bearing outer ring ~~(5)~~ of one of the two rows of coaxial bearings ~~(1, 1')~~.

9.   (Currently Amended)   Sensor arrangement according to claim ~~7 or 8~~ <u>7</u>, in which the N sensors ~~(8)~~ comprise strain sensors, and the at least one radial mode shape comprises a mode shape of order zero and one or more mode shapes of order two or higher.

10. (Currently Amended) Sensor arrangement according to claim ~~7 or 8~~ 7, in which the N sensors ~~(8)~~ comprise displacement sensors, and the at least one radial mode shape comprises one or more mode shapes of order zero or higher.

11. (Currently Amended) Sensor arrangement according to ~~one of the claims 7 through 10~~ claim 7, in which the mode shape coefficient calculator ~~(11)~~ is further arranged to determine N/2 Chebyshev polynomial coefficients representing at least one axial mode shape of the ring shaped element ~~(5, 6, 7)~~.

12. (Currently Amended) Sensor arrangement according to ~~one of the claims 7 through 11~~ claim 7, in which the bearing neural network ~~(12)~~ is trained using a plurality of data sets, each data set comprising a predefined load vector on a specific type of rolling element bearing ~~(1)~~ and associated measurement data from the N sensors ~~(8)~~.

13. (Currently Amended) Sensor arrangement according to ~~one of claims 7 through 12~~ claim 7, in which the bearing inner ring ~~(6)~~ or outer ring ~~(5)~~ are attached to a sensor holder ~~(2)~~, a circumferential recession ~~(3)~~ being provided between at least part of the contacting surfaces of the inner ring ~~(6)~~ or outer ring ~~(5)~~ and the sensor holder ~~(2)~~.

14. (New) Method according to claim 2, further comprising determining N/2 Chebyshev polynomial coefficients from the N sensor signals, representing at least one axial mode shape of the ring shaped element.

15. (New) Method according to claim 2, in which the bearing neural network is trained using a plurality of data sets, each data set comprising a predefined load vector on a specific type of rolling element bearing and associated measurement data from the N sensors.

16.   (New)   Sensor arrangement according to claim 8, in which the N sensors comprise strain sensors, and the at least one radial mode shape comprises a mode shape or order zero and one or more mode shapes of order two or higher.

17.   (New)   Sensor arrangement according to claim 8, in which the N sensors comprise displacement sensors, and the at least one radial mode shape comprises one or more mode shapes of order zero or higher.

18.   (New)   Sensor arrangement according to claim 8, in which the bearing inner ring or outer ring are attached to a sensor holder, a circumferential recession being provided between at least part of the contacting surfaces of the inner ring or outer ring and the sensor holder.

19.   (New)   Sensor arrangement according to claim 9, in which the bearing inner ring or outer ring are attached to a sensor holder, a circumferential recession being provided between at least part of the contacting surfaces of the inner ring or outer ring and the sensor holder.

20.   (New)   Sensor arrangement according to claim 10, in which the bearing inner ring or outer ring are attached to a sensor holder, a circumferential recession being provided between at least part of the contacting surfaces of the inner ring or outer ring and the sensor holder.